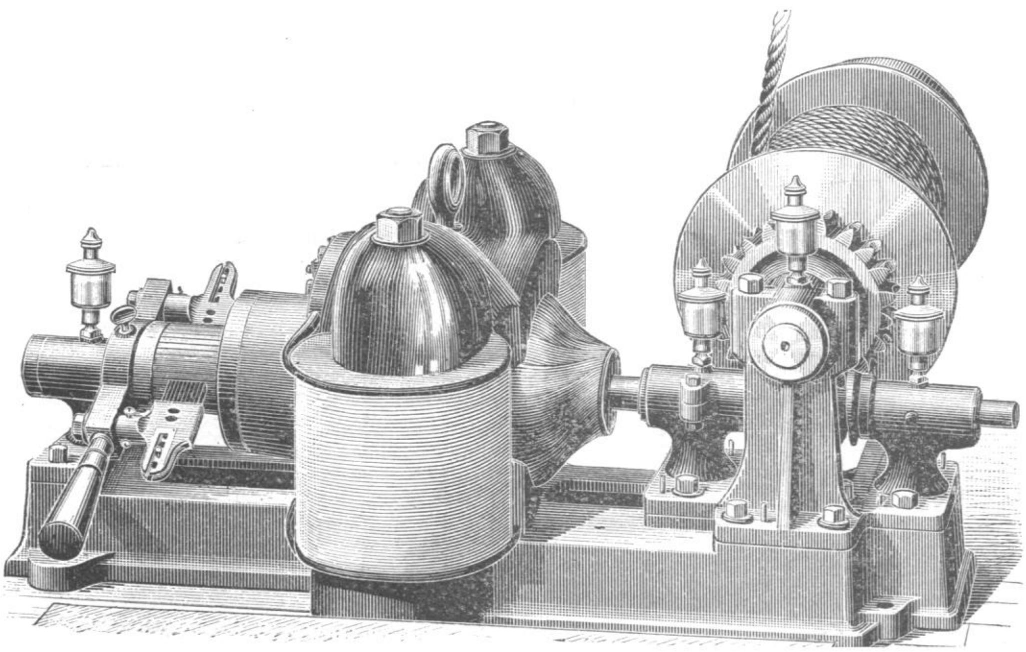
INDUSTRIAL NOTES.

Electric Shell Hoist for War-Vessels.

WE publish in this issue of our paper a view of one of the electric hoists built by the Sprague Electric Railway and Motor Company of New York, for the new United States cruiser "Atlanta." This hoist is the first of its kind that has been built for this work, and this commencement of the use of electric power on shipboard is most novel, and promises to extend rapidly. The advantages of electric power for the manifold uses on board vessels, over transmission of power by steam to different portions of the vessel, are many, and the general adoption of incandescent lighting on shipboard enables such motors to be operated without additional dynamo installation.

The hoist which we illustrate is of three horse-power, using the regular Sprague graphite brushes, and can be run forwards or backwards with the greatest facility by the simple movement in one direction or another of an electric switch. By means of this same switch the speed can be varied to any degree desired.

Although built for the special purpose of hoisting shells, this combination promises to meet a large demand for small hoists in manufacturing and other industries, where the small space occupied by an electric motor is quite a desideratum.



SPRAGUE ELECTRIC SHELL HOIST.

The tendency among the leading electric supply companies seems to be gradually towards electric motor combinations with other machines, like the above; and experience shows that such combinations create a demand as their advantages become recognized.

New Electric-Light Plants.

The Thomson-Houston Electric Company reports the following sales: Narragansett Pier, R.I., 30 arc, 1,000 incandescent; Seattle, W.T., 50 arc; Brockport, N.Y., 20 arc; Troy, O., 50 arc; Somerville, Mass., 100 arc; Binghamton, N.Y., 150 arc; Philadelphia, Penn., 100 arc; Lowell, Mass., 50 arc; Boston, Mass., 1,000 alternating; Springfield, Mass., 90 arc; Minneapolis, Minn., 150 arc, 1,200 incandescent; Rochester, N.H., 50 arc; Chelsea, Mass., 100 arc; Norwich, Conn., 400 incandescent; Goldsboro, N.J., 45 arc, 600 incandescent; Sorrento, Me., 30 arc. They also report the following isolated plants: Wamsutta Mills, New Bedford, Mass., 400 incandescent; Bennett Manufacturing Company, New Bedford, Mass., 600 incandescent; Whittle & Hanrahan, Providence, R.I., 15 arc; H. Ricker & Sons, Poland Springs, Me., 12 arc; Jewell Milling Company, Brooklyn, N.Y., 300 incandescent; M. W. Hyer, New York, 50 incandescent; Lawrence Line Company, Lawrence, Mass., 50 incandescent; Riverside Mills, Providence, R.I., 25 incandescent.

The Complete Combustion Boiler.

Mr. Francis E. Galloupe, mechanical engineer, tested the evaporative performance of a 100-horse-power steam-boiler having the downward draught furnace, at the works of the Suffolk Cordage Company, Chelsea, Mass., Feb. 25.

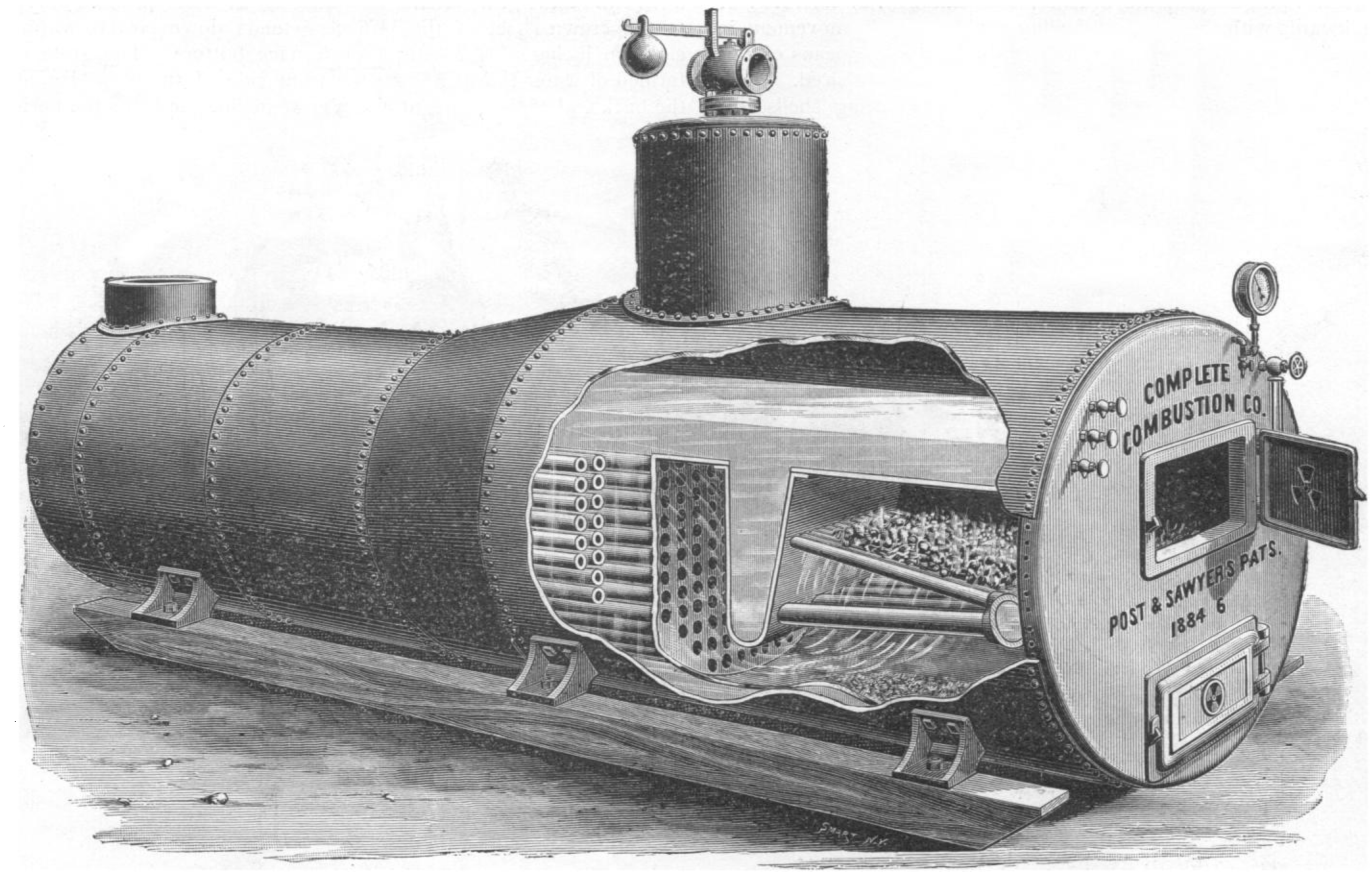
The boiler tested was a horizontal, cylindrical, multitubular boiler, and did not differ in design, either of the general construction or portions occupied by the water and steam, from that of the ordinary form, except in the furnace. The furnace is built of steel plates riveted like those of the shell, and is placed entirely within the shell of the boiler, and surrounded by water spaces. At the back end of the grate a hanging water-leg of steel plates, riveted to the crown sheet of the furnace, extends downward to within eighteen inches of the ash-pit or furnace bottom. The grate is formed of water tubes entering the front side of the water-leg, at the back end of the grate, at a moderate inclination from the horizontal, and enters a gun-metal box in front, just below the furnace doors. Return tubes, also inclined, extend from this box beneath the great tubes back to the water-leg, and insure a circulation of water from the main shell and water-leg, through the grate tubes. The space beneath the grate, ordinarily the ash-pit, is the combustion-chamber, the air for combustion being admitted through the fire-doors above the grate, and drawn down through the grate-bars by the chimney draught, where it becomes highly heated before or during its combination with the hot gases from the coal. Beyond the water-leg, extending up to the crown sheet of the furnace, is an extension of the combustion-chamber, which forms the passage to the tubes, the tube sheet being eighteen inches horizontally from back of the water-leg. The hot gases pass from this point through the tubes, which form a large absorbing area, directly to the uptake and chimney.

The position and arrangement of the furnace resemble that in the locomotive boiler, with the addition of a deflecting arch, which tends to mix the hot gases on their way to the tubes, and, as would be expected from this construction of an internal furnace entirely surrounded by the water-heating surfaces of the boiler, the boiler made steam very quickly, and almost immediately on lighting the fire.

During the trial a large Brown engine, stated to have been developing about 210 horse-power, was run by the steam from the

boiler under test, in connection with one other boiler of usual form; and although all the machinery of the works, including about 35 horse-power used in running generators for electric lights, was thrown on the engine, no difficulty was found in holding the steam-pressure required, with the flue damper one-third open, and fire-doors closed or placed ajar for a considerable portion of the time. The boiler showed considerable reserve capacity for an increase of power, whenever a demand was made upon it.

In the matter of safety it would seem that this construction is safer than the ordinary form. The crown sheet over the furnace has usually the least depth of water over it of any plate in a boiler exposed to the action of the fire, and is at the same time exposed to the fiercest temperature of the fire. The result of low water, should the crown sheet not be covered, would be, in the ordinary case, to burn the plate, with a resulting bulging of the sheet, or perhaps the explosion of the boiler. In this boiler the hottest temperature of the fire is beneath the grate, where all the surrounding surfaces are protected by water, which instantaneously absorbs the heat coming in contact with them; while the direction of the draught being downward and away from the crown sheet, and the latter being still further cooled by the entering air used for combustion, the crown sheet is kept comparatively cool, with, in any case, little probability of burning. Should the water-level be lowered below the grate, the grate-tubes would burn off, and destroy the fire.



COMPLETE COMBUSTION BOILER.

An important advantage in supplying the air above the grate is that it is never necessary to open the combustion-chamber to the outside air, which cools the entire boiler, and causes loss of heat in the ordinary boiler whenever the furnace is fired. Throughout the trial the ash-pit doors were kept closed.

The boiler was covered with asbestos, brick setting being unnecessary on account of the use of the internal furnace. Since the radiation from the steam and water surfaces of the boiler was reduced by the covering to a minimum, the only losses of heat that could occur were either (1) by not supplying air in the right quantity or manner to consume the coal perfectly; (2) by admitting too great a quantity of air, which would be heated and wasted; or (3) by too strong a draught in the flue to the chimney, which would take off the hot gases before there was time for the absorption of their heat by the boiler. At the beginning of the test the flue damper was open, and the temperature in the uptake was 590° F. On closing the damper to about one-third opening, at which point it was kept during the remainder of the trial, temperatures varying from 330° to 375° F. were obtained. At the steam-pressure carried, the temperature of the steam and water in the boiler was about 330° F., showing that the loss of heat above this temperature through the chimney was very small, varying from nothing to at no time more than about 40° F.

The firing was skilfully managed, and, so far as could be determined, no unnecessary amount of air was admitted. The percentage of refuse to the coal burned (9.91) shows that the coal, which was the best dry Cumberland to be had, was quite perfectly consumed.

From the above considerations and conditions, it would be expected that this boiler, properly run, would give high economical results. These were an evaporation from an average temperature of $53\frac{1}{2}$° F. into steam of an average gauge pressure of 80 pounds, of 9.82 pounds of water per pound of coal. The equivalent evaporation, reduced to the standard of from and at 212° F. was 11.78 pounds, and per pound of combustible, 13.08 pounds. The average result of a large number of tests made with different boilers at the Centennial Exhibition of 1876 was 10.99 pounds of water per pound of combustible.

The boiler shows, as above, good proportions; and the conditions of setting, draught of chimney, etc., were favorable. The steam appeared to be of excellent quality, free from moisture, and there was no priming. The coal was charged as dry coal, no deduction being made for moisture. The water-consumption was accurately obtained by weighing all the water fed to the boiler, and there was no leakage. The water-level in the boiler was the same at the beginning and end of the test, and the steam-pressure made uniform at both times.